WHAT IS CLAIMED:

1. An atrial defibrillator, comprising:

a portable, non-implantable housing;

a pair of defibrillator pads operable to be applied to the outside of a patient's body;

a shock generator disposed in the housing, coupled to the pads, and operable to shock the patient via the pads; and

an analyzer disposed in the housing and operable to receive a cardiac signal from the patient, to determine from the signal whether the patient is experiencing atrial fibrillation, and to enable the shock generator if the patient is experiencing atrial fibrillation.

2. The atrial defibrillator of claim 1, further comprising a control device disposed in the housing and coupled to and operable to activate the shock generator.

3. The atrial defibrillator of claim 1, further comprising a safety device disposed in the housing and operable to prevent the patient from activating the shock generator.

4. The atrial defibrillator of claim 1, further comprising a verification device disposed in the housing and operable to prevent an unauthorized person from activating the shock generator.

5. The atrial defibrillator of claim 1 wherein the analyzer is operable to receive the cardiac signal via the pads.

6. The atrial defibrillator of claim 1 wherein:

the cardiac signal comprises an electrocardiogram having R-R intervals; and

the analyzer is operable to determine whether the patient is experiencing atrial fibrillation by;

measuring the durations of the R-R intervals,

calculating the respective differences between the lengths of contiguous ones of the R-R intervals,

comparing the calculated differences to a difference threshold, and

determining that the patient is experiencing atrial fibrillation if one of the calculated differences exceeds the threshold.

Sub A2

7. The atrial defibrillator of claim 1 wherein:

the cardiac signal comprises an electrocardiogram having R-R intervals; and

the analyzer is operable to determine whether the patient is experiencing atrial fibrillation by;

measuring the durations of a first group of the R-R intervals,

calculating the respective differences between the durations of contiguous ones of the R-R intervals in the first group,

comparing the calculated differences to a difference threshold,

repeating the measuring, calculating, and comparing for a second group of the R-R intervals, and

determining that the patient is experiencing atrial fibrillation if one of the first-group differences and one of the second-group differences exceed the threshold.

8. The atrial defibrillator of claim 1, further comprising:

a memory coupled to the analyzer and operable to store a normal QRS signal of the patient;

wherein the cardiac signal comprises an electrocardiogram having QRS signals and R-R intervals; and

wherein the analyzer is operable to determine whether the patient is experiencing atrial fibrillation by;

measuring the durations of the R-R intervals,

calculating respective R-R differences between the lengths of contiguous ones of the R-R intervals,

comparing the calculated R-R differences to an R-R threshold,

calculating a QRS difference between one of the QRS signals of the cardiac signal and the stored QRS signal,

comparing the calculated QRS difference to a QRS threshold, and

determining that the patient is experiencing atrial fibrillation if one of the R-R differences equals or exceeds the R-R threshold and the QRS difference is less than the QRS threshold.

Sub A2

9. The atrial defibrillator of claim 1 wherein:

the cardiac signal comprises an electrocardiogram having R-R intervals; and

the analyzer is operable to determine whether the patient is experiencing atrial fibrillation by;

measuring the durations of the R-R intervals,

calculating respective differences between the lengths of contiguous ones of the R-R intervals,

comparing the calculated differences to a difference threshold,

determining the patient's heart rate,

determining whether the patient's heart rate is within a predetermined range of heart rates, and

determining that the patient is experiencing atrial fibrillation if one of the differences exceeds the threshold and the heart rate is within the predetermined range.

10. The atrial defibrillator of claim 1 wherein the analyzer is further operable to determine from the cardiac signal whether the atrial fibrillation terminates after the shock generator shocks the patient.

Sub A3

11. The atrial defibrillator of claim 1 wherein:

the cardiac signal comprises an electrocardiogram having R-R intervals; and

the analyzer is further operable to determine from the cardiac signal whether the atrial fibrillation terminates after the shock generator shocks the patient by;

measuring the lengths of the R-R intervals,

calculating respective differences between the lengths of contiguous ones of the R-R intervals,

comparing the calculated differences to a difference threshold, and

determining that the atrial fibrillation is terminated if one of the calculated differences is less than the difference threshold.

12. The atrial defibrillator of claim 1 wherein:

the cardiac signal comprises an electrocardiogram that includes an R wave having a rising edge; and

the analyzer is operable to enable the shock generator during the rising edge of the R wave and to disable the shock generator outside of the rising edge.

13. A method, comprising:

receiving a cardiac signal from a patient;

determining from the signal whether the patient is experiencing atrial fibrillation; and

shocking the patient with a portable shock generator if the patient is experiencing atrial fibrillation.

14. The method of claim 13, further comprising:

applying defibrillator pads to the patient;

wherein the receiving comprises receiving the cardiac signal via the pads; and

wherein the shocking comprises shocking the patient via the pads.

15. The method of claim 13 wherein the determining comprises:

measuring the lengths of R-R intervals in the signal;

calculating the respective differences between the lengths of contiguous ones of the R-R intervals;

comparing the calculated differences to a difference threshold; and

determining that the patient is not in atrial fibrillation if one of the calculated differences is less than the difference threshold.

16. The method of claim 13, further comprising:

storing a normal QRS signal of the patient; and

wherein the determining comprises;

measuring the lengths of R-R intervals of the cardiac signal,

calculating the respective differences between the lengths of contiguous ones of the R-R intervals,

comparing the calculated differences to an R-R threshold,

calculating a difference between a QRS signal of the cardiac signal and the stored QRS signal,

comparing the calculated QRS difference to a QRS threshold, and

determining that the patient is not in atrial fibrillation if one of the calculated differences is less than the R-R threshold or if the QRS difference is greater than or equal to the QRS threshold.

17. The method of claim 13 wherein the determining comprises:

determining the patient's heart rate; and

determining that the patient is not in atrial fibrillation if the heart rate is outside of a predetermined range.

18. The method of claim 13, further comprising determining from the cardiac signal whether the atrial fibrillation terminates after shocking the patient.

19. The method of claim 13 wherein the shocking comprises shocking the patient during a rising edge of an R wave in the cardiac signal.

20. A method, comprising:

receiving a cardiac signal from a patient;

determining from the signal whether the patient is experiencing atrial fibrillation;

identifying an operator of a shock generator;

enabling the shock generator if the operator is authorized to operate the shock generator; and

shocking the patient with the shock generator in response to a shock command from the operator if the patient is experiencing atrial fibrillation.

21. The method of claim 20, further comprising disabling the shock generator if the operator is identified as the patient.